INTRODUCTION TO FINITE ELEMENT METHOD

1	Course Title:	INTRODUCTION TO FINITE ELEMENT METHOD	
2	Course Code:	INS4011	
3	Type of Course:	Optional	
4	Level of Course:	First Cycle	
5	Year of Study:	4	
6	Semester:	7	
7	ECTS Credits Allocated:	5.00	
8	Theoretical (hour/week):	3.00	
9	Practice (hour/week):	1.00	
10	Laboratory (hour/week):	0	
11	Prerequisites:	None	
12	Language:	Turkish	
13	Mode of Delivery:	Face to face	
14	Course Coordinator:	Doç. Dr. M.ÖZGÜR YAYLI	
15	Course Lecturers:	Doç. Dr. M. Özgür Yaylı	
16	Contact information of the Course Coordinator:	bdeliktas@uludag.edu.tr 224 2900744 Uludağ Univ. Müh.Mim Fak. İnşaat Müh. Böl. Görükle, Bursa	
17	Website:	http://insaat.uludag.edu.tr	
18	Objective of the Course:	To provide a numerical method and its application to study of the behavior of structures from wide class of engineering materials under a complex loading.	
19	Contribution of the Course to Professional Development:	1. Performing analysis of civil engineering structures with the help of matrices. 2. Realizing the solution of structural elements with complex loading and boundary conditions.	
20	Learning Outcomes:		
		1	Be able to describe the limitations of the analytical method in providing solution of engineering problems
		2	Be able to aware of and explain the advantages and disadvantages of the finite element comparing with analytical and other numerical method
		3	Be able to describe main principles and steps of the finite element method
		4	Be able to establish finite element formulations for a physical problem given in its differential equation form
		5	Be able to write simple programs for the finite element formulations
		6	Be able to model engineering problems by using finite element package program
		7	Be able to perform the finite element solutions of different structures using a modern computer code and able to interpret the results
		8	
		9	
		10	
21	Course Content:		
	Course Content:		

Week	Theoretical	Practice
1	Introduction Basic principles, types of differential equations, repeat of matrix algebra	
2	Fundamentals, Stiffness matrix of spring, bar, and beam elements	Problem solving
3	Variational formulation of differential equations and approximation	Problem solving
4	Formulation of one dimensional problems	Code development
5	Analysis of one dimensional problems	Computer applications
6	Formulation of two and three dimensional problems Plane stress ,plain strain problems	Code development
7	Formulation of two and three dimensional problems Axisymmetric , three dimensional problems	Code development
8	Isoperimetric formulation, bar and quadratic plane elements	Code development
9	Isoperimetric formulation, hexagonal and triangle elements	Problem solving
10	Numerical integration	Problem solving
11	Introduction to a finite element package program and establishing the basic models	Computer applications
12	Analysis of engineering problems using the finite element package program	Computer applications
13	Analysis of engineering problems using the finite element package program	Computer applications
14	Homework presentation	

Activites	Number	Duration (hour)	Total Work Load (hour)
Theoretical	14	3.00	42.00
Practicals/Labs	14	1.00	14.00
Self study and preperation	14	4.00	56.00
Homeworks	6	4.00	24.00
Projects	2	6.00	12.00
Field Studies	0	0.00	0.00
Midterm exams	1	3.00	3.00
Others	0	0.00	0.00
Final Exams	1	3.00	3.00
Total Work Load			157.00
Total work load/ 30 hr			5.13
ECTS Credit of the Course			5.00

TERM LEARNING ACTIVITIES	NUMBER	WEIGHT
Midterm Exam	1	25.00
Quiz	0	0.00
Home work-project	6	25.00
Final Exam	1	50.00
Total	8	100.00
Contribution of Term (Year) Learning Activities to Success Grade		50.00
Contribution of Final Exam to Success Grade		50.00
Total		100.00

Materials:

Prentice Hall, 1996.

T , Wiley & Sons, Inc., 2007

Huebner et al, John Wiley & Sons, Inc., 2001

Robert D. Cook et al, John Wiley &Sons, Inc., 2002

Measurement and Evaluation Techniques Used in the Course	Understanding the principles of applied mathematics used in the course

24	ECTS / WORK LOAD TABLE

25	CONTRIBUTION OF LEARNING OUTCOMES TO PROGRAMME QUALIFICATIONS															
	PQ1	**PQ2**	**PQ3**	**PQ4**	**PQ5**	**PQ6**	**PQ7**	**PQ8**	**PQ9**	**PQ10**	**PQ11**	**PQ12**	**PQ13**	**PQ14**	**PQ15**	**PQ16**
ÖK1	4	5	0	0	0	3	3	0	0	0	0	0	0	0	0	0
ÖK2	4	5	0	0	0	5	0	3	0	0	0	0	0	0	0	0
ÖK3	0	4	0	0	0	5	3	0	0	0	0	0	0	0	0	0
ÖK4	4	4	4	5	0	4	0	0	0	0	0	0	0	0	0	0
ÖK5	0	3	0	5	0	0	0	0	0	5	0	0	0	0	0	0
ÖK6	4	4	4	5	0	0	0	0	0	4	0	0	0	0	0	0
ÖK7	4	5	0	5	0	0	0	0	0	0	0	4	0	0	0	0
LO: Learning Objectives PQ: Program Qualifications																
Contribution Level:	**1 very low**		**2 low**			**3 Medium**			**4 High**			**5 Very High**				